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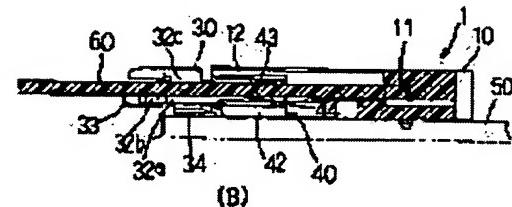
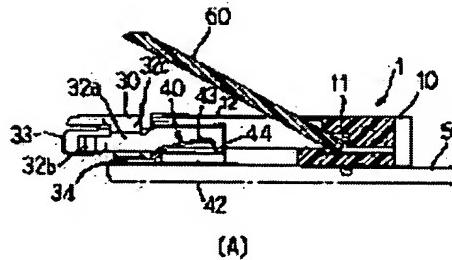
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**(54) CARD EDGE CONNECTOR**

**(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a card edge connector capable of certainly accomplishing grounding of a child board to a parent board through a latch member.

**SOLUTION:** This card edge connector 1 has an insulative housing 10 and a metallic latch member 30. The insulating housing 10 is mounted on a parent board 50 and has a child board receiving recessed part 11 longitudinally extending. A child board 60 is inserted in the child board receiving recessed part 11 at a first angle and turned to be positioned at a second angle, while the latch member 30 is disposed near a longitudinal end part of the housing 10 and keeps the child board 60 at the second angle. The latch member 30 is connected to a ground pattern of the parent board 50. The housing 10 is mounted with a metallic contact auxiliary member 40 having both a first elastic contact part 43 elastically contacting with a ground pattern of the child board 60 and a second elastic contact part 44 elastically contacting with the latch member 30.



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**CLAIMS**

[Claim(s)]

[Claim 1] The edge connector characterized by attaching in the aforementioned housing the metal grounding auxiliary member of one characterized by providing the following Insulating housing which has the child substrate acceptance crevice which is attached in a parent substrate and prolonged in a longitudinal direction It is arranged near the edge of the longitudinal direction of this housing, and the metal latch member which holds the child substrate which was inserted at the 1st angle into the aforementioned child substrate acceptance crevice, and which back-rotated and became the 2nd angle at the 2nd angle of the above is provided. The 2nd elastic-contact section which contacts elastically the 1st elastic-contact section which contacts the grounding pattern of the aforementioned child substrate elastically, and the aforementioned latch member in the edge connector by which this latch member is connected to the grounding pattern of the aforementioned parent substrate

[Claim 2] the aforementioned grounding assistance -- the edge connector according to claim 1 characterized by the aforementioned 1st elastic-contact section of a member bending in the direction which gains in the elastic force to the aforementioned child substrate while contacting the grounding pattern of the aforementioned child substrate, in case the aforementioned child substrate rotates at the 2nd angle of the above from the 1st angle of the above

[Claim 3] The edge connector which is equipped with the following and characterized by preparing in one the piece of an elastic contact which contacts elastically to the grounding pattern of the aforementioned child substrate at the aforementioned latch member in the edge connector by which this latch member is connected to the grounding pattern of the aforementioned parent substrate. Insulating housing which has the child substrate acceptance crevice which is attached in a parent substrate and prolonged in a longitudinal direction the metal latch which holds the child substrate which has been arranged near the edge of the longitudinal direction of this housing, and was inserted at the 1st angle into the aforementioned child substrate acceptance crevice, and which back-rotated and became the 2nd angle at the 2nd angle of the above -- a member

[Claim 4] The edge connector according to claim 3 characterized by preparing in one the piece of fault stress prevention which prevents that the aforementioned piece of an elastic contact bends too much in the aforementioned latch member.

[Claim 5] The edge connector according to claim 4 to which the aforementioned latch member is characterized by having provided the monotonous section of two sheets turned up mutually, having prepared in one the connection connected to the grounding pattern of the aforementioned parent substrate at one side of this monotonous section, the child substrate attaching part which holds the aforementioned child substrate at the 2nd angle of the above, and the aforementioned piece of fault stress prevention, and preparing the aforementioned piece of an elastic contact in another side of the aforementioned monotonous section in one.

[Claim 6] The aforementioned piece of fault stress prevention is an edge connector according to claim 5 characterized by preventing one relief of the aforementioned monotonous section in contact with another side of the aforementioned monotonous section in case the aforementioned child substrate held by the aforementioned child substrate attaching part is energized by force upwards.

[Claim 7] The edge connector according to claim 5 characterized by preparing in one the piece of fault move prevention which prevents too much movement of the aforementioned child substrate in

case the aforementioned child substrate contacts the aforementioned piece of an elastic contact in one side of the aforementioned monotonous section.

[Claim 8] The aforementioned piece of fault move prevention is an edge connector according to claim 7 characterized by preventing too much variation rate to one outside of the aforementioned monotonous section in contact with another side of the aforementioned monotonous section in case the variation rate of the aforementioned child substrate attaching part is carried out outside and maintenance of the aforementioned child substrate is canceled.

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[Translation done.]

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention is attached in a parent substrate and relates to the edge connector connected free [ attachment and detachment of a child substrate ].

[0002]

[Description of the Prior Art] Conventionally, what is attached in a parent substrate, and makes the edge connector connected free [ attachment and detachment of a child substrate ], for example, is shown in drawing 9 is known (refer to the patent No. 2649988 official report).

[0003] one pair of metal latches which this edge connector 100 has the latch acceptance crevice 112 formed in the ends of the child substrate acceptance crevice 111 prolonged in a longitudinal direction, and the child substrate acceptance crevice 111, are received by the insulating housing 110 attached in the parent substrate 130, two or more contacts (not shown) prepared in the seriate along with the longitudinal direction of housing 110, and the latch acceptance crevice 112 of housing 110, and are fixed to housing 110 -- a member 120 provides And solder connection of each of contact is made at the parent substrate 130, and attachment fixation of the metal latch 120 is carried out at the parent substrate 130.

[0004] and -- while rotating in the direction of the arrow R shown in drawing 9 while the child substrate 140 is received at the 1st angle in the child substrate acceptance crevice 111 of housing 110 and contacting contact at the 2nd angle -- a latch -- the angle is held by the member 120 Thereby, the child substrate 140 is electrically connected to the parent substrate 130 through each contact of an edge connector 100. and the child substrate 140 -- a latch -- the time of being held by the member 120 -- the child substrate 140 -- a latch -- the inside of the child substrate acceptance opening 121 of a member 120 -- entering -- a latch -- it is held in a predetermined position by the latch heights 122 of a member 120, and the stopper 113 formed in housing 110

[0005] moreover, grounding to the parent substrate 130 of the child substrate 140 -- the grounding pattern 141 on the child substrate 140 -- a latch -- the grounding pattern 141 on connecting [ 140 ] with the grounding pattern on the parent substrate 130 (not shown) electrically through a member 120, i.e., a child substrate, -- a latch -- it is attained by contacting a member 120

[0006]

[Problem(s) to be Solved by the Invention] however, the latch which the grounding pattern 141 on the child substrate 140 contacts if it is in this conventional edge connector 100 -- the portion of a member 120, i.e., a latch, -- the width of face of the child substrate acceptance opening 121 of a member 120 is large a little rather than the board thickness of the child substrate 140 for this reason, the case where the force of the direction of arrow R acts on the child substrate 140 according to a certain external factor -- the grounding pattern 141 on the child substrate 140 -- a latch -- there was a possibility of separating from a member 120 and there was a possibility that grounding to the parent substrate 130 of the child substrate 140 might not be attained in order to make it not rotate the child substrate 140 within the child substrate acceptance opening 121 on the other hand -- a latch -- when width of face of the child substrate acceptance opening 121 of a member 120 was made the same as the board thickness of the child substrate 140, there was a possibility that the child substrate 140 could not be put in in the child substrate acceptance opening 121 according to those size errors etc.

[0007] Therefore, the purpose of this invention is to offer the edge connector which can attain

grounding to the parent substrate of a child substrate certainly through a latch member.

[0008]

[Means for Solving the Problem] Insulating housing which has the child substrate acceptance crevice which the edge connector concerning this invention is attached in a parent substrate, and is prolonged in a longitudinal direction, It is arranged near the edge of the longitudinal direction of this housing, and the metal latch member which holds the child substrate which was inserted at the 1st angle into the aforementioned child substrate acceptance crevice, and which back-rotated and became the 2nd angle at the 2nd angle of the above is provided. In the edge connector by which this latch member is connected to the grounding pattern of the aforementioned parent substrate It is characterized by attaching in the aforementioned housing the metal grounding auxiliary member which has the 2nd elastic-contact section which contacts elastically the 1st elastic-contact section which contacts the grounding pattern of the aforementioned child substrate elastically, and the aforementioned latch member.

[0009] moreover, the aforementioned grounding assistance -- if the aforementioned 1st elastic-contact section of a member bends in the direction which gains in the elastic force to the aforementioned child substrate while contacting the grounding pattern of the aforementioned child substrate in case the aforementioned child substrate rotates at the 2nd angle of the above from the 1st angle of the above, it is effective

[0010] Moreover, insulating housing which has the child substrate acceptance crevice which the edge connector concerning this invention is attached in a parent substrate, and is prolonged in a longitudinal direction, It is arranged near the edge of the longitudinal direction of this housing, and the metal latch member which holds the child substrate which was inserted at the 1st angle into the aforementioned child substrate acceptance crevice, and which back-rotated and became the 2nd angle at the 2nd angle of the above is provided. This latch member is characterized by preparing in one the piece of an elastic contact which contacts elastically to the grounding pattern of the aforementioned child substrate at the aforementioned latch member in the edge connector connected to the grounding pattern of the aforementioned parent substrate.

[0011] It is desirable to prepare in one the piece of fault stress prevention which prevents that the aforementioned piece of an elastic contact bends too much in the aforementioned latch member.

[0012] Moreover, it is good for the aforementioned latch member to possess the monotonous section of two sheets turned up mutually, to prepare in one the connection connected to the grounding pattern of the aforementioned parent substrate at one side of this monotonous section, the child substrate attaching part which holds the aforementioned child substrate at the 2nd angle of the above, and the aforementioned piece of fault stress prevention, and to prepare the aforementioned piece of an elastic contact in another side of the aforementioned monotonous section in one.

[0013] Furthermore, it is effective if one relief of the aforementioned monotonous section is prevented in contact with another side of the aforementioned monotonous section in case the aforementioned child substrate by which the aforementioned piece of fault stress prevention was held by the aforementioned child substrate attaching part is energized by force upwards.

[0014] If the piece of fault move prevention which prevents too much movement of the aforementioned child substrate is prepared in one side of the aforementioned monotonous section in one in case the aforementioned child substrate contacts the aforementioned piece of an elastic contact, it is much more effective.

[0015] In addition, if too much variation rate to one outside of the aforementioned monotonous section is prevented in contact with another side of the aforementioned monotonous section in case the aforementioned piece of fault move prevention carries out the variation rate of the aforementioned child substrate attaching part outside and cancels maintenance of the aforementioned child substrate, it is much more effective.

[0016]

[Embodiments of the Invention] The gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is the plan of 1 operation gestalt of the edge connector of this invention.

Drawing 2 is the left lateral view of the edge connector of drawing 1. Drawing 3 is the front view of the edge connector of drawing 1. However, contact is omitted in drawing 3. Drawing 4 is the enlarged view of the arrow A portion of drawing 1. (A) is the cross section with which drawing 5

showed housing used for the edge connector of drawing 1, a part plan and (B) met partial front view, and (C) met the 5C-5C line of (A). Drawing 6 shows the grounding auxiliary member used for the edge connector of drawing 1, and (A) is [ front view and (C of a plan and (B)) ] right lateral views. Drawing 7 shows the state where the grounding auxiliary member was attached in housing, (A) is front view and (B) is a sectional side elevation. Drawing 8 shows rotation operation of the child substrate inserted in the edge connector of drawing 1, and (A) is a cross section in the state where the child substrate was inserted at the 1st angle, and a cross section in the state where the child substrate rotated (B) at the 2nd angle.

[0017] In drawing 1 or drawing 4, and drawing 8 an edge connector 1 The insulating housing 10 which has the child substrate acceptance crevice 11 which is attached in the parent substrate 50 and prolonged in a longitudinal direction, Two or more contacts 20 which were connected to the parent substrate 50 and have been arranged along with the longitudinal direction of housing 10 at vertical 2 seriate, one pair of metal latches which hold the child substrate 60 which has been arranged near the both ends of the longitudinal direction of housing 10, and was inserted at the 1st angle into the child substrate acceptance crevice 11, and which back-rotated and became the 2nd angle at the 2nd angle -- with a member 30 while being attached in housing 10 and contacting the grounding pattern (not shown) of the child substrate 60 elastically -- a latch -- one pair of metal grounding assistance which contacts a member 30 elastically -- the member 40 is provided And in case the child substrate 60 is inserted at the 1st angle into the child substrate acceptance crevice 11 (refer to drawing 8 (A)) In case it enters between the trains of two or more contacts 20 arranged at vertical 2 seriate, and rotates and is held at the 2nd angle (refer to drawing 8 (B)), the contact 20 of vertical 2 train is contacted and, thereby, the electrical installation of the child substrate 60 and the parent substrate 50 is attained. Here, in this operation gestalt, although the 1st angle of the above is an angle which inclined only about 30 degrees to the parent substrate 50 and the 2nd angle of the above is an angle of the parent substrate 50 and an abbreviation horizontal, an angle is not limited to these.

[0018] Here, as shown in drawing 1 or drawing 5, housing 10 is the insulating 1 soma material formed in the interior with the abbreviation rectangle object which has the child substrate acceptance crevice 11 prolonged in a longitudinal direction, and projects and forms one pair of arm sections 12 in the both ends. it is shown in each arm section 12 at drawing 4, drawing 5, and drawing 7 -- as -- a latch -- a member 30 is received and the latch acceptance crevice 13 for carrying out pressing fixation is formed moreover, the grounding assistance which one pair of plinth sections 15 which follow side-attachment-wall 12a of the arm section 12 are projected and formed in the ends of the bottom wall 14 of the child substrate acceptance crevice 11, and is later mentioned in each plinth section 15 -- the crevice 16 for pressing fit where the pressing section 41 of a member 40 is pressed fit is formed Nose-of-cam 15a of each plinth section 15 is the same flat surface as posterior-wall-of-stomach 13a of the cross direction (longitudinal direction in drawing 5 (C)) of the latch acceptance crevice 13 formed in each arm section 12. Height 15b of the Sai chief tabular which follows other side-attachment-wall 12b dented rather than side-attachment-wall 12a of the arm section 12 is projected and formed in nose-of-cam 15a of each plinth section 15.

[0019] moreover, a latch -- a member 30 a metal plate so that it may be formed blanking and by carrying out bending and may be best shown in drawing 4 and drawing 8 With pressing Itabe 31 pressed fit in the latch acceptance crevice 13 of housing 10 The child substrate attaching part 32 ahead turned up by the abbreviation U typeface from pressing Itabe 31, It is bent inside (left-hand side in drawing 4 ) from the soffit of the piece section 33 of fault stress prevention ahead prolonged from pressing Itabe 31, and the piece section 33 of fault stress prevention, and the solder peg 34 by which solder connection is made is provided to the grounding pattern (not shown) of the parent substrate 50. a latch -- as a metal plate of a member 30, the metal plate of the product made from stainless steel for example, is desirable The child substrate attaching part 32 possesses hook type hook section 32b which was located ahead of plate-like part 32a ahead turned up by the abbreviation U typeface from pressing Itabe 31, and plate-like part 32a, and was projected inside, and piece of child substrate maintenance 32c bent inside from the upper limit of plate-like part 32a. Here, if the child substrate 60 inserted into the child substrate acceptance crevice 11 is rotated at the 2nd angle from the 1st angle as shown in drawing 8, piece of child substrate maintenance 32c will return to the original position, once it moves outside by the elastic force of plate-like part 32a, and will prevent

the relief of the child substrate 60 in contact with the upper surface of the marginal part of the child substrate 60. Moreover, hook section 32b enters in the notch (not shown) formed in the marginal part of the child substrate 60, in case the child substrate 60 is located in the 2nd angle, and it prevents the omission from the connector 1 of the child substrate 60. Furthermore, in case the child substrate attaching part 32 tends to bend outside too much, piece of child substrate maintenance 32c contacts, and it is prevented by the piece section 33 of fault stress prevention that fault stress is applied to plate-like part 32a. in addition, a latch -- the grounding assistance which mentions a member 30 later -- it is pressed fit in the latch acceptance crevice 13, after carrying out pressing fixation of the member 40 at housing 10, as shown in drawing 7

[0020] moreover, grounding assistance -- as it is formed blanking and by carrying out bending and is best shown in drawing 6 and drawing 7, a member 40 a metal plate Pressing Itabe 41 pressed fit in the crevice 16 for pressing fit of housing 10, and U typeface section 42 ahead prolonged by the cross-section abbreviation U typeface from pressing Itabe 41, The 1st elastic-contact section 43 which contacts elastically the grounding pattern (not shown) which is turned up from the front end of U typeface section 42 upper wall, and is prolonged in the shape of a cantilever in the slanting upper part towards back, and which was formed in the rear face of the child substrate 60, the latch back prolonged in the shape of a cantilever towards an outside while being bent towards the upper part from the side edge of U typeface section 42 upper wall -- the 2nd elastic-contact section 44 which contacts elastically the side of plate-like part 32a of a member 30 is provided grounding assistance -- as a metal plate of a member 40, the metal plate of the product made from stainless steel for example, is desirable U typeface section 42 -- grounding assistance -- when pressing Itabe 41 of a member 40 is pressed fit in the crevice 16 for pressing fit of housing 10, it is shown in drawing 7 (A) -- as -- height 15b of housing 10 -- putting -- thereby -- grounding assistance -- regulation of movement of the vertical direction of a member 40 is assisted moreover -- this U typeface section 42 -- a latch -- when a member 30 is pressed fit in the latch acceptance crevice 13, it is shown in drawing 4 -- as -- a latch -- the piece of a convex bent inside from the soffit of plate-like part 32a of a member 30 -- 32d -- entering -- thereby -- a latch -- regulation of movement of the vertical direction of a member 30 is assisted moreover, the 2nd elastic-contact section 44 is shown in drawing 4 and drawing 8 -- as -- grounding assistance -- the latch after pressing Itabe 41 of a member 40 was pressed fit in the crevice 16 for pressing fit of housing 10 -- if pressing Itabe 31 of a member 30 is pressed fit in the latch acceptance crevice 13 -- a latch -- the side of plate-like part 32a of a member 30 is contacted elastically the elastic force of the 2nd elastic-contact section 44 -- a latch -- since it is quite small as compared with the elastic force of plate-like part 32a of a member 30 -- the elastic force of the 2nd elastic-contact section 44 -- a latch -- it does not separate from piece of child substrate maintenance 32c of a member 30 from the edge of the child substrate 60 On the other hand, it bends in the direction which gains in the elastic force to the child substrate 60 while it contacts the grounding pattern of the child substrate 60, in case the 1st elastic-contact section 43 rotates at the 2nd angle from the 1st angle, as the child substrate 60 shows drawing 8.

[0021] As shown in drawing 8 (B), in case the child substrate 60 is held at the 2nd angle In contact with plate-like part 32a of a member 30 grounding assistance -- while the 1st elastic-contact section 43 of a member 40 touches the grounding pattern of the child substrate 60 -- the 2nd elastic-contact section 44 -- a latch -- furthermore, a latch -- since solder connection of the solder peg 34 of a member 30 is made at the grounding pattern of the parent substrate 50, the grounding pattern of the child substrate 60 is grounded by the grounding pattern of the parent substrate 50 in this case, the child substrate 60 rotates further from the 2nd angle according to a certain external factor -- having -- a latch -- \*\*\*\*\* it separates from piece of child substrate maintenance 32c of a member 30 -- grounding assistance -- since the 1st elastic-contact section 43 of a member 40 touches the grounding pattern of the child substrate 60 elastically, the grounding state over the parent substrate 50 of the child substrate 60 is not canceled In addition, since the 1st elastic-contact section 43 bends in the direction which gains in the elastic force to the child substrate 60 while contacting the grounding pattern of the child substrate 60 in case the child substrate 60 rotates at the 2nd angle from the 1st angle An elastic force [ as opposed to / though the child substrate 60 rotates further from the 2nd angle / the child substrate 60 of the 1st elastic-contact section 43 ] increases further, the 1st elastic-contact section 43 is not certainly separated from the child substrate 60, and grounding to the parent

substrate 50 of the child substrate 60 is made much more certainly.

[0022] Next, with reference to drawing 10 or drawing 16, other operation gestalten of the edge connector of this invention are explained. Drawing 10 is the plan of other operation gestalten of the edge connector of this invention. Drawing 11 is the front view of the edge connector of drawing 10. the latch to which drawing 12 is used for the edge connector of drawing 10 -- it is the plan of a member drawing 13 -- the latch of drawing 12 -- it is the right lateral view of a member drawing 14 - - the latch of drawing 12 -- it is the bottom plan view of a member drawing 15 -- the latch of drawing 12 -- it is the front view of a member Drawing 16 is a fragmentary sectional view in the state where the child substrate rotated at the 2nd angle.

[0023] In drawing 10 or drawing 16 an edge connector 201 The insulating housing 210 which has the child substrate acceptance crevice 211 which is attached in the parent substrate 240 and prolonged in a longitudinal direction, Two or more contacts 220 which were connected to the parent substrate 240 and have been arranged along with the longitudinal direction of housing 210 at vertical 2 seriate, one pair of metal latches which hold the child substrate 250 which has been arranged near the both ends of the longitudinal direction of housing 210, and was inserted at the 1st angle into the child substrate acceptance crevice 211, and which back-rotated and became the 2nd angle at the 2nd angle -- the member 230 is provided Unlike the edge connector shown in drawing 1 or drawing 8 , the grounding auxiliary member is not prepared. And the child substrate 250 enters between the trains of two or more contacts 220 arranged at vertical 2 seriate when inserted at the 1st angle into the child substrate acceptance crevice 211, in case it rotates and is held at the 2nd angle (refer to drawing 16 ), the contact 220 of vertical 2 train is contacted and, thereby, the electrical installation of the child substrate 250 and the parent substrate 240 is attained.

[0024] Housing 210 is the insulating 1 soma material formed in the interior with the abbreviation rectangle object which has the child substrate acceptance crevice 211 prolonged in a longitudinal direction, as shown in drawing 10 and drawing 11 . Housing 210 is formed by fabricating insulating resin material. the near longitudinal direction ends of housing 210 -- a latch -- one pair of latch pressing crevices 212 for carrying out pressing fixation of pressing Itabe 233 of a member 230 are formed Moreover, the rib 213 for preventing \*\*\*\*\* of the child substrate 250 is formed in the longitudinal direction right end (right end in drawing 11 ) approach of the child substrate acceptance crevice 211. Although a rib 213 is prolonged towards a low wall 215 from the upper wall 214 of the child substrate acceptance crevice 211, the crevice 216 is formed between low walls 215. If the rib 213 has connected with the low wall 215 of the child substrate acceptance crevice 211, in case housing 210 will be fabricated, although it is pulled by the rib 213 and may deform, by forming this crevice 216, the low wall 215 of the child substrate acceptance crevice 211 is not pulled by the rib 213 at the time of fabrication, and does not transform the low wall 215 of the child substrate acceptance crevice 211.

[0025] moreover, a latch -- the member 230 possesses the monotonous section 231,232 of two sheets turned up mutually, as it is formed blanking and by carrying out bending and a metal plate is shown in drawing 12 or drawing 16 and in one monotonous section 231 of this monotonous section 231,232 With pressing Itabe 233 who is located in the back end (right end in drawing 12 ) and who is pressed fit in the latch pressing crevice 212 of housing 210 The connection 234 by which solder connection is made at the grounding pattern of the parent substrate 240 bent and formed towards the outside (on [ in drawing 12 ]) from the soffit, The child substrate attaching part 235 which is located in the front end and which holds the child substrate 250 at the 2nd angle, and piece of fault stress prevention 236 \*\*\*\* bent and formed towards the inside from the soffit are prepared in one. Moreover, while the monotonous section 232 of another side of the monotonous sections 231,232 bends towards the inside from a soffit, the piece 237 of an elastic contact which is prolonged towards the front and which contacts the grounding pattern of the child substrate 250 elastically is formed in it in one. The piece 236 of fault stress prevention is located in the piece 237 bottom of an elastic contact, and prevents that the piece 237 of an elastic contact bends too much caudad. For this reason, the piece 237 of an elastic contact does not deform plastically. Moreover, the piece 236 of fault stress prevention is located in the monotonous section 232 bottom of another side, and in case the child substrate 250 held by the child substrate attaching part 235 is energized by force upwards, it prevents the relief of one monotonous section 231 in contact with the soffit of the monotonous section 232 of

another side. For this reason, in case the child substrate 250 is energized by force upwards, the child substrate attaching part 235 prepared in one monotonous section 231 does not deform plastically. The child substrate attaching part 235 has prepared in one hook type hook section 235a which was prolonged from the front end of one monotonous section 231, and was projected inside, piece of child substrate maintenance 235b bent inside from the upper limit of the monotonous section 231, and piece of fault move prevention 235c bent inside from the soffit of the monotonous section 231. Here, if the child substrate 250 inserted into the child substrate acceptance crevice 11 is rotated at the 2nd angle from the 1st angle as shown in drawing 16, piece of child substrate maintenance 235b will return to the original position, once it moves outside by the elastic force of one monotonous section 231, and will prevent the relief of the child substrate 250 in contact with the upper surface of the marginal part of the child substrate 250. Moreover, hook section 235a enters in the notch (not shown) formed in the marginal part of the child substrate 250, in case the child substrate 250 is located in the 2nd angle, and it prevents the omission from the connector 1 of the child substrate 250. In case piece of fault move prevention 235c carries out the variation rate of the piece of child substrate maintenance 235b outside and cancels maintenance of the child substrate 250 while it prevents too much movement in the lower part of the child substrate 250, in case the child substrate 250 contacts the piece 237 of an elastic contact, it prevents too much variation rate to the outside of one monotonous section 231 in contact with the monotonous section 232 of another side. Since movement in the lower part of the child substrate 250 is prevented by piece of fault move prevention 235c, in the 2nd angular position, the child substrate 250 does not secede from the child substrate attaching part 235. Moreover, since piece of fault move prevention 235c prevents too much variation rate to the outside of one monotonous section 231 in contact with the monotonous section 232 of another side in case it carries out the variation rate of the piece of child substrate maintenance 235b outside and cancels maintenance of the child substrate 250, the plastic deformation of one monotonous section at the time of canceling maintenance of the child substrate 250 is prevented. [0026] the time of the child substrate 250 being held at the 2nd angle, as shown in drawing 16 -- a latch -- while the piece 237 of an elastic contact of a member 230 touches the grounding pattern of the child substrate 250 -- a latch -- since solder connection of the connection 234 of a member 230 is made at the grounding pattern of the parent substrate 240, the grounding pattern of the child substrate 250 is grounded by the grounding pattern of the parent substrate 240 grounding of as opposed to the parent substrate 240 of the child substrate 250 as compared with the edge connector 1 which shows the edge connector 201 shown in drawing 10 or drawing 16 to drawing 1 or drawing 8 - - a latch -- a member 230 -- accepting it -- coming out -- carrying out -- grounding assistance -- there is an advantage at the point which does not use a member 40 and the child substrate 250 rotates further from the 2nd angle according to a certain external factor -- having -- a latch -- \*\*\*\*\* it separates from piece of child substrate maintenance 235b of a member 230 -- a latch -- since the piece 237 of an elastic contact of a member 230 touches the grounding pattern of the child substrate 250 elastically, the grounding state over the parent substrate 240 of the child substrate 250 is not canceled In addition, since the piece 237 of an elastic contact bends in the direction which gains in the elastic force to the child substrate 250 while contacting the grounding pattern of the child substrate 250 in case the child substrate 250 rotates at the 2nd angle from the 1st angle An elastic force [ as opposed to / though the child substrate 250 rotates further from the 2nd angle / the child substrate 250 of the piece 237 of an elastic contact ] increases further, the piece 237 of an elastic contact is not certainly separated from the child substrate 250, and grounding to the parent substrate 240 of the child substrate 250 is made much more certainly.

[0027] The contact 221,222 of vertical 2 train of the low order end (low order end in drawing 11 ) of two or more contacts 220 arranged at vertical 2 seriate at housing 210 is contact for the power for supplying the power from the parent substrate 240 to the electrical part on the child substrate 250. Since there is a possibility of receiving an electric shock when people's finger touches on these contacts 221 and 222 during energization of the contacts 221 and 222 for these power, it is necessary to prevent the \*\*\*\*. Then, one pair of heights 217a and 217b ahead prolonged in the both sides of the lower contact 222 are formed in the low wall 215 of housing 210, a rib 213 is formed in a upper wall 214, and the heights 217c and 217d back prolonged in the both sides of the upper contact 221 are formed in the posterior wall of stomach of housing 210 at it. Heights 217a and 217b prevent that

a finger touches the solder connection of the contact 222 of the bottom connected to the parent substrate 240, a rib 213 prevents that a finger touches the contact section of the lower contact 222, and Heights 217c and 217d prevent that a finger touches on the upper contact 221.

[0028] the latch in the edge connector of this invention -- the modification of a member is explained with reference to drawing 17 and drawing 18 drawing 17 -- a latch -- the plan of the modification of a member, and drawing 18 -- the latch of drawing 17 -- it is the right lateral view of a member

[0029] the latch shown in drawing 17 and drawing 18 -- the latch which shows a member 330 to drawing 12 or drawing 16 -- like a member 230, a metal plate is formed blanking and by carrying out bending, and the monotonous section 331,332 of two sheets turned up mutually is provided And pressing Itabe 333 pressed fit in the latch pressing crevice 212 of housing 210, the connection 334 by which solder connection is made at the grounding pattern of the parent substrate 240 bent and formed towards the outside from the soffit, and the child substrate attaching part 335 which holds the child substrate 250 at the 2nd angle are formed in one at one monotonous section 331 of this monotonous section 331,332. Moreover, while being turned up outside from the front end section of the ulnar margin of the piece 336 of fault stress prevention bent towards the inside from the soffit, and the piece 336 of fault stress prevention, the piece 337 of an elastic contact which is prolonged towards back and which contacts the grounding pattern of the child substrate 250 elastically is formed in the monotonous section 332 of another side of the monotonous sections 331,332 in one. The piece 336 of fault stress prevention is located in the piece 337 bottom of an elastic contact, and prevents that the piece 237 of an elastic contact bends too much caudad. For this reason, the piece 337 of an elastic contact does not deform plastically. Moreover, the piece 336 of fault stress prevention is bent towards the inside from the abbreviation whole region of the longitudinal direction of the soffit of the monotonous section 332. the latch which shows the child substrate attaching part 335 to drawing 12 or drawing 16 -- a member 230 -- the same -- from the front end of one monotonous section 331 -- being prolonged -- the inside -- a protrusion -- hook type hook section 335a, piece of child substrate maintenance 335b bent inside from the upper limit of the monotonous section 331, and piece of fault move prevention 335c bent inside from the soffit of the monotonous section 331 are prepared in one the bottom In case piece of fault move prevention 335c carries out the variation rate of the piece of child substrate maintenance 335b outside and cancels maintenance of the child substrate 250 while it prevents too much movement in the lower part of the child substrate 250, in case the child substrate 250 contacts the piece 237 of an elastic contact, it prevents too much variation rate to the outside of one monotonous section 331 in contact with the monotonous section 332 of another side. Since movement in the lower part of the child substrate 250 is prevented by piece of fault move prevention 335c, in the 2nd angular position, the child substrate 250 does not secede from the child substrate attaching part 335. Moreover, since piece of fault move prevention 335c prevents too much variation rate to the outside of one monotonous section 331 in contact with the monotonous section 332 of another side in case it carries out the variation rate of the piece of child substrate maintenance 335b outside and cancels maintenance of the child substrate 250, the plastic deformation of one monotonous section 331 at the time of canceling maintenance of the child substrate 250 is prevented. in addition, the latch shown in drawing 12 or drawing 16 since the piece 336 of fault stress prevention formed in the monotonous section 332 is bent towards the inside from the abbreviation whole region of the longitudinal direction of the soffit of the monotonous section 332 -- a second moment of area is large than the monotonous section 232 of a member 230, there are few the amounts which deform into \*\* which piece of fault move prevention 335c contacts towards an outside, and the plastic deformation of one monotonous section 331 prevents much more effectively

[0030] drawing 19 -- a latch -- it is the plan showing other modifications of a member the latch shown in drawing 19 -- the latch which shows the structure with a fundamental member 430 to drawing 17 and drawing 18 -- how to be the same as that of a member 330, and extend the piece 437 of an elastic contact -- a latch -- it differs from the member 330 That is, the piece 437 of an elastic contact is prolonged towards the front while it is turned up outside from the back end section of the ulnar margin of the piece 436 of fault stress prevention.

[0031] drawing 20 -- a latch -- it is the perspective diagram showing the modification besides one more of a member the latch shown in drawing 20 -- the latch which shows a member 530 to drawing

12 or drawing 16 -- like a member 230, a metal plate is formed blanking and by carrying out bending, and the monotonous section 531,532 of two sheets turned up mutually is provided and in one monotonous section 531 of this monotonous section 531,532 With pressing Itabe pressed fit in the housing 210 located back (not shown) The connection (not shown) by which solder connection is made, and the child substrate attaching part (not shown) which is located ahead and which holds the child substrate 250 at the 2nd angle are prepared in the grounding pattern of the parent substrate 240 bent and formed towards the outside from the soffit in one. The piece 535 of fault move prevention bent inside from the soffit of the monotonous section 531 is formed in the child substrate attaching part. In case the piece 535 of fault move prevention carries out the variation rate of the child substrate attaching part outside and cancels maintenance of the child substrate 250, it prevents too much variation rate to the outside of one monotonous section 531 in contact with the monotonous section 532 of another side. Moreover, if the monotonous section 532 of another side of the monotonous sections 531,532 bends towards the inside from a soffit, in it, the piece 537 of an elastic contact which is prolonged towards the front and which contacts the grounding pattern of the child substrate 250 elastically, and the lobe 536 bent by the upper part from the back section of the ulnar margin of the piece 537 of an elastic contact are provided. In case the child substrate 250 is held by the child substrate attaching part at the 2nd angle, a lobe 536 enters into opening formed in the child substrate 250, and prevents the omission ahead of the child substrate 250.

[0032]

[Effect of the Invention] since the metal grounding auxiliary member which has the 2nd elastic-contact section which contacts elastically the 1st elastic-contact section which contacts the grounding pattern of a child substrate elastically, and a latch member was attached in housing according to the edge connector concerning a claim 1 -- the grounding pattern of a child substrate -- grounding assistance -- it is certainly grounded by the grounding pattern of a parent substrate through a member and a latch member

[0033] moreover -- according to the edge connector concerning a claim 2 -- the aforementioned grounding assistance -- the aforementioned 1st elastic-contact section of a member Since it bends in the direction which gains in the elastic force to the aforementioned child substrate while contacting the grounding pattern of the aforementioned child substrate in case the aforementioned child substrate rotates at the 2nd angle from the 1st angle An elastic force [ as opposed to / though a child substrate rotates further from the 2nd angle / the child substrate of the 1st elastic-contact section ] increases further, the 1st elastic-contact section is not certainly separated from a child substrate, and grounding to the parent substrate of a child substrate is made much more certainly.

[0034] Since the piece of an elastic contact which contacts elastically at the grounding pattern of a child substrate was prepared in the latch member in one according to the edge connector concerning a claim 3, the grounding pattern of a child substrate is certainly grounded by the grounding pattern of a parent substrate only by the latch member.

[0035] Since the piece of fault stress prevention which prevents that the aforementioned piece of an elastic contact bends too much in the aforementioned latch member was prepared in one according to the edge connector concerning a claim 4, in case the grounding pattern of a child substrate contacts the piece of an elastic contact, the piece of an elastic contact does not deform plastically.

[0036] According to the edge connector concerning a claim 5, the aforementioned latch member The connection which possesses the monotonous section of two sheets turned up mutually, and is connected to the grounding pattern of the aforementioned parent substrate at one side of this monotonous section, Since the child substrate attaching part which holds the aforementioned child substrate at the 2nd angle of the above, and the aforementioned piece of fault stress prevention were prepared in one and the aforementioned piece of an elastic contact was prepared in another side of the aforementioned monotonous section in one The latch member of the integral construction equipped with the function to hold a child substrate, the function to ground a child substrate certainly to a parent substrate, and the fault stress prevention function of the piece of an elastic contact can be manufactured easily.

[0037] According to the edge connector concerning a claim 6, since one relief of the aforementioned monotonous section is prevented in contact with another side of the aforementioned monotonous section in case the aforementioned child substrate held by the aforementioned child substrate

attaching part is energized by force upwards, in case a child substrate is energized by force upwards, the child substrate attaching part prepared in one monotonous section does not deform plastically the aforementioned piece of fault stress prevention.

[0038] Since according to the edge connector concerning a claim 7 the piece of fault move prevention which prevents too much movement of the aforementioned child substrate was prepared in one side of the aforementioned monotonous section in one when the aforementioned child substrate contacted the aforementioned piece of an elastic contact, in the 2nd angular position held by the child substrate attaching part, a child substrate does not secede from a child substrate attaching part.

[0039] According to the edge connector concerning a claim 8, since too much variation rate to one outside of the aforementioned monotonous section is prevented in contact with another side of the aforementioned monotonous section in case the variation rate of the aforementioned child substrate attaching part is carried out outside and maintenance of the aforementioned child substrate is canceled, the aforementioned piece of fault move prevention can prevent the plastic deformation of one monotonous section at the time of canceling maintenance of a child substrate.

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[Translation done.]

\* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] It is the plan of 1 operation gestalt of the edge connector of this invention.

[Drawing 2] It is the left lateral view of the edge connector of drawing 1 .

[Drawing 3] It is the front view of the edge connector of drawing 1 . However, contact is omitted in drawing 3 .

[Drawing 4] It is the enlarged view of the arrow A portion of drawing 1 .

[Drawing 5] (A) is the cross section with which housing used for the edge connector of drawing 1 was shown, a part plan and (B) met partial front view, and (C) met the 5C-5C line of (A).

[Drawing 6] The grounding auxiliary member used for the edge connector of drawing 1 is shown, and (A) is [ front view and (C of a plan and (B)) ] right lateral views.

[Drawing 7] The state where the grounding auxiliary member was attached in housing is shown, (A) is front view and (B) is a sectional side elevation.

[Drawing 8] Rotation operation of the child substrate inserted in the edge connector of drawing 1 is shown, and (A) is a cross section in the state where the child substrate was inserted at the 1st angle, and a cross section in the state where the child substrate rotated (B) at the 2nd angle.

[Drawing 9] It is the partial perspective diagram of the edge connector of the conventional example.

[Drawing 10] It is the plan of other operation gestalten of the edge connector of this invention.

[Drawing 11] It is the front view of the edge connector of drawing 10 .

[Drawing 12] the latch used for the edge connector of drawing 10 -- it is the plan of a member

[Drawing 13] the latch of drawing 12 -- it is the right lateral view of a member

[Drawing 14] the latch of drawing 12 -- it is the bottom plan view of a member

[Drawing 15] the latch of drawing 12 -- it is the front view of a member

[Drawing 16] A child substrate is a fragmentary sectional view in the state where it rotated at the 2nd angle.

[Drawing 17] a latch -- it is the plan of the modification of a member

[Drawing 18] the latch of drawing 17 -- it is the right lateral view of a member

[Drawing 19] a latch -- it is the plan of other modifications of a member

[Drawing 20] a latch -- it is the perspective diagram of the modification besides one more of a member

[Description of Notations]

1,210 Edge connector

10,210 Housing

11,211 Child substrate acceptance crevice

30,230 a latch -- member

40 Grounding Assistance -- Member

43 1st Elastic-Contact Section

44 2nd Elastic-Contact Section

50,240 Parent substrate

60,250 Child substrate

231,232 Monotonous section

234 Connection

235 Child Substrate Attaching Part

- 235c The piece of fault move prevention
  - 236 Piece of Fault Stress Prevention
  - 237 Piece of Elastic Contact
- 

[Translation done.]

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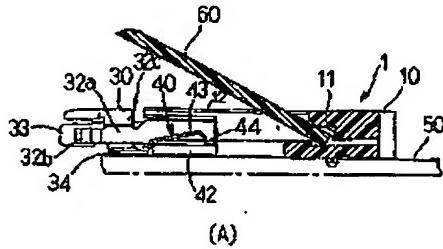
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(54)【発明の名称】 カードエッジコネクタ

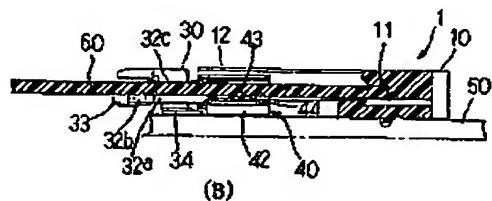
## (57)【要約】

【課題】 子基板の朝基板への接地を、ラッチ部材を介して確実に達成できるカードエッジコネクタを提供する。

【解決手段】 カードエッジコネクタ1は、朝基板50に取り付けられ、長手方向に延びる子基板受容凹部11を有する絶縁性のハウジング10と、ハウジング10の長手方向の端部近傍に配置され、子基板受容凹部11内に第1角度で挿入された後、回転されて第2角度となった子基板60を第2角度に保持する金属製のラッチ部材30とを具備している。ラッチ部材30は、朝基板50の接地パターンに接続されている。子基板60の接地パターンに導性的に接触する第1導性接触部43及びラッチ部材30に弾性的に接触する第2弾性接触部44を有する金属製の接地補助部材40をハウジング10に取り付けている。



(A)



(B)

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特開2000-208183

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## 【特許請求の範囲】

【請求項1】 親基板に取り付けられ、長手方向に伸びる子基板受容凹部を有する絶縁性のハウジングと、該ハウジングの長手方向の邊部近傍に配置され、前記子基板受容凹部内に第1角度で挿入された後回転されて第2角度となった子基板を前記第2角度に保持する金属製のラッチ部材とを具備し、該ラッチ部材が前記親基板の接地パターンに接続されているカードエッジコネクタにおいて。

前記子基板の接地パターンに弾性的に接触する第1弹性接触部及び前記ラッチ部材に弾性的に接触する第2弹性接触部を有する一体の金属製の接地補助部材を前記ハウジングに取り付けたことを特徴とするカードエッジコネクタ。

【請求項2】 前記接地補助部材の前記第1弹性接触部は、前記子基板が前記第1角度から前記第2角度に回転する際に、前記子基板の接地パターンに接觸すると共に前記子基板への弾性力が増す方向に捲むようになっていることを特徴とする請求項1記載のカードエッジコネクタ。

【請求項3】 親基板に取り付けられ、長手方向に伸びる子基板受容凹部を有する絶縁性のハウジングと、該ハウジングの長手方向の邊部近傍に配置され、前記子基板受容凹部内に第1角度で挿入された後回転されて第2角度となった子基板を前記第2角度に保持する金属製のラッチ部材とを具備し、該ラッチ部材が前記親基板の接地パターンに接続されているカードエッジコネクタにおいて。

前記ラッチ部材に、前記子基板の接地パターンに弾性的に接触する弹性接触片を一体的に設けたことを特徴とするカードエッジコネクタ。

【請求項4】 前記ラッチ部材に、前記弹性接触片が過度に捲むのを防止する過応力防止片を一体的に設けたことを特徴とする請求項3記載のカードエッジコネクタ。

【請求項5】 前記ラッチ部材が、互いに折り重ねられた2枚の平板部を具備し、該平板部の一方に前記親基板の接地パターンに接続される接続部、前記子基板を前記第2角度に保持する子基板保持部、及び前記過応力防止片を一体的に設け、前記平板部の他方に前記弹性接触片を一体的に設けたことを特徴とする請求項4記載のカードエッジコネクタ。

【請求項6】 前記過応力防止片は、前記子基板保持部によって保持された前記子基板が上方へ傾き付勢される際に前記平板部の他方に当接して前記平板部の一方の浮き上がりを防止することを特徴とする請求項5記載のカードエッジコネクタ。

【請求項7】 前記平板部の一方に、前記子基板が前記弹性接触片に接触する際に前記子基板の過度の移動を防止する過移動防止片を一体的に設けたことを特徴とする請求項5記載のカードエッジコネクタ。

【請求項8】 前記過移動防止片は、前記子基板保持部を外側へ変位させて前記子基板の保持を解除する際に前記平板部の他方に当接して前記平板部の一方の外側への過度の変位を防止することを特徴とする請求項7記載のカードエッジコネクタ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、親基板に取り付けられ、子基板を着脱自在に接続するカードエッジコネクタに関する。

【0002】

【従来の技術】 従来、親基板に取り付けられ、子基板を着脱自在に接続するカードエッジコネクタとして、例えば、図9に示すものが知られている（特許第2649988号公報参照）。

【0003】 このカードエッジコネクタ100は、長手方向に伸びる子基板受容凹部111及び子基板受容凹部111の両端に形成されたラッチ受容凹部112を有し、親基板130に取り付けられる絶縁性のハウジング110と、ハウジング110の長手方向に沿って列状に設けられた複数のコンタクト（図示せず）と、ハウジング110のラッチ受容凹部112に受容されてハウジング110に固定される1対の金属製ラッチ部材120とを具備している。そして、コンタクトの各々は、親基板130に半田接続され、金属製ラッチ120は親基板130に取付固定される。

【0004】 そして、子基板140は、ハウジング110の子基板受容凹部111内に第1角度で受容されると共に、図9に示す矢印Rの方向に回転されて第2角度で

30 コンタクトに接觸すると共にラッチ部材120によりその角度が保持される。これにより、子基板140はカードエッジコネクタ100の各コンタクトを介して親基板130に電気的に接続される。そして、子基板140がラッチ部材120により保持される際には、子基板140はラッチ部材120の子基板受容開口121に入り込み、ラッチ部材120のラッチ凸部122とハウジング110に設けられたストップ113により所定位置に保持されるようになっている。

【0005】 又、子基板140の親基板130への接地40 は、子基板140上の接地パターン141がラッチ部材120を介して親基板130上の接地パターン（図示せず）へ電気的に接続されることにより、即ち子基板140上の接地パターン141がラッチ部材120に接觸することにより達成される。

【0006】

【発明が解決しようとする課題】 しかしながら、この従来のカードエッジコネクタ100にあっては、子基板140上の接地パターン141が接觸するラッチ部材120の部分、即ちラッチ部材120の子基板受容開口121の幅が子基板140の板厚よりも若干大きくなってしまい

(3)

特開2000-208183

3

る。このため、何らかの外的要因により子基板140に矢印R方向の力が作用する場合、子基板140上の接地パターン141がラッチ部材120から離れてしまう虞れがあり、子基板140の親基板130への接地が達成されない虞れがあった。一方、子基板140を子基板受容開口121内で回転させないようにするために、ラッチ部材120の子基板受容開口121の幅を子基板140の板厚と同じとすると、それらの寸法誤差等により子基板140を子基板受容開口121内に入れることができない虞れがあった。

【0007】従って、本発明の目的は、子基板の親基板への接地を、ラッチ部材を介して確実に達成できるカードエッジコネクタを提供することにある。

【0008】

【課題を解決するための手段】本発明に係るカードエッジコネクタは、親基板に取り付けられ、長手方向に延びる子基板受容凹部を有する絶縁性のハウジングと、該ハウジングの長手方向の端部近傍に配置され、前記子基板受容凹部内に第1角度で挿入された後回転されて第2角度となった子基板を前記第2角度に保持する金属製のラッチ部材とを具備し、該ラッチ部材が前記親基板の接地パターンに接続されているカードエッジコネクタにおいて、前記子基板の接地パターンに彈性的に接觸する第1弾性接觸部及び前記ラッチ部材に彈性的に接觸する第2弾性接觸部を有する金属製の接地補助部材を前記ハウジングに取り付けたことを特徴としている。

【0009】又、前記接地補助部材の前記第1弾性接觸部は、前記子基板が前記第1角度から前記第2角度に回転する際に、前記子基板の接地パターンに接觸すると共に前記子基板への彈性力が増す方向に構むようになっていいると効果的である。

【0010】又、本発明に係るカードエッジコネクタは、親基板に取り付けられ、長手方向に延びる子基板受容凹部を有する絶縁性のハウジングと、該ハウジングの長手方向の端部近傍に配置され、前記子基板受容凹部内に第1角度で挿入された後回転されて第2角度となった子基板を前記第2角度に保持する金属製のラッチ部材とを具備し、該ラッチ部材が前記親基板の接地パターンに接続されているカードエッジコネクタにおいて、前記ラッチ部材に、前記子基板の接地パターンに彈性的に接觸する弾性接觸片を一体的に設けたことを特徴としている。

【0011】前記ラッチ部材に、前記弾性接觸片が過度に構むのを防止する過応力防止片を一体的に設けることが好ましい。

【0012】又、前記ラッチ部材が、互いに折り重ねられた2枚の平板部を具備し、該平板部の一方に前記親基板の接地パターンに接続される接続部、前記子基板を前記第2角度に保持する子基板保持部、及び前記過応力防止片を一体的に設け、前記平板部の他方に前記弾性接觸

4

片を一体的に設けることよい。

【0013】更に、前記過応力防止片が、前記子基板保持部によって保持された前記子基板が上方へ無理に付勢される際に前記平板部の他方に当接して前記平板部の一方の浮き上がりを防止するようになっていると効果的である。

【0014】前記平板部の一方に、前記子基板が前記彈性接觸片に接觸する際に前記子基板の過度の移動を防止する過移動防止片を一体的に設けると一層効果的である。

【0015】加えて、前記過移動防止片が、前記子基板保持部を外側へ変位させて前記子基板の保持を解除する際に前記平板部の他方に当接して前記平板部の一方の外側への過度の変位を防止するようになっていると一層効果的である。

【0016】

【発明の実施の形態】本発明の実施の形態を図面を参照して説明する。図1は、本発明のカードエッジコネクタの一実施形態の平面図である。図2は、図1のカードエッジコネクタの左側面図である。図3は、図1のカードエッジコネクタの正面図である。但し、図3においてコントラクトは省略してある。図4は、図1の矢印A部分の拡大図である。図5は、図1のカードエッジコネクタに使用されるハウジングを示し、(A)は部分平面図、(B)は部分正面図、(C)は(A)の5C-5D線に沿った断面図である。図6は、図1のカードエッジコネクタに使用される接地補助部材を示し、(A)は平面図、(B)は正面図、(C)は右側面図である。図7は、接地補助部材をハウジングに取り付けた状態を示し、(A)は正面図、(B)は側断面図である。図8は、図1のカードエッジコネクタに挿入された子基板の回転動作を示し、(A)は子基板が第1角度で挿入された状態の断面図、(B)は子基板が第2角度に回転された状態の断面図である。

【0017】図1乃至図4及び図8において、カードエッジコネクタ1は、親基板50に取り付けられ、長手方向に延びる子基板受容凹部11を有する絶縁性のハウジング10と、親基板50に接続され、ハウジング10の長手方向に沿って上下2列状に配置された複数のコンタクト20と、ハウジング10の長手方向の両端部近傍に配設され、子基板受容凹部11内に第1角度で挿入された後回転されて第2角度となった子基板60を第2角度に保持する1対の金属製のラッチ部材30と、ハウジング10に取り付けられ、子基板60の接地パターン(図示せず)に彈性的に接觸すると共にラッチ部材30に彈性的に接觸する1対の金属製の接地補助部材40とを具備している。そして、子基板60は、子基板受容凹部11内に第1角度で挿入される際(図8(A)参照)に、上下2列状に配設された複数のコンタクト20の列間に入り込み、回転されて第2角度に保持される際(図8(B)参照)には、上下2列のコンタクト20に接觸し、これ

(4)

特開2000-208183

5

により子基板60と親基板50との電気的接続が達成される。ここで、本実施形態において、前記第1角度は、親基板50に対して約30°だけ傾いた角度であり、前記第2角度は、親基板50と略水平の角度であるが、角度はこれらに限定されない。

【0018】ここで、ハウジング10は、図1乃至図5に示すように、内部に長手方向に延びる子基板受容凹部11を有する略矩形体で形成された絶縁性の一体部材であり、その両端部に1対のアーム部12を突出形成している。各アーム部12には、図4、図5、及び図7に示すように、ラッチ部材30を受容し、圧入固定するためのラッチ受容凹部13が形成されている。又、子基板受容凹部11の底壁14の両端には、アーム部12の側壁12aに連続する1対の台座部15が突出形成され、各台座部15には、後述する接地補助部材40の圧入部41が圧入される圧入用凹部16が形成されている。各台座部15の先端15aは、各アーム部12に形成されたラッチ受容凹部13の前後方向(図5(C)における左右方向)の後壁13aと同一平面となっている。各台座部15の先端15aには、アーム部12の側壁12aよりも凹んだ他の側壁12bに連続する細長板状の突起部15bが突出形成されている。

【0019】又、ラッチ部材30は、金属板を打抜き及び歯け加工することによって形成され、図4及び図8に最も良く示されるように、ハウジング10のラッチ受容凹部13内に圧入される圧入板部31と、圧入板部31から略U字形に前方に折り返された子基板保持部32と、圧入板部31から前方に延びる過応力防止片部33と、過応力防止片部33の下端から内側(図4における左側)に折り曲げられ、親基板50の接地パターン(図示せず)に半田接続されるソルダベグ34とを具備している。ラッチ部材30の金属板としては、例えば、ステンレス製の金属板が好ましい。子基板保持部32は、圧入板部31から略U字形に前方に折り返された板状部32aと、板状部32aの前方に位置し内側に突出した鉤型のフック部32bと、板状部32aの上端から内側に折り曲げられた子基板保持片32cとを具備している。ここで、子基板保持片32cは、図8に示すように、子基板受容凹部11内に挿入された子基板60を第1角度から第2角度に回転すると、板状部32aの弾性力により一旦外側に移動してから元の位置に復帰し、子基板60の縁部の上面に接して子基板60の浮き上がりを防止する。又、フック部32bは、子基板60が第2角度に位置する際に子基板60の縁部に形成された切欠(図示せず)内に入り込み、子基板60のコネクタ1からの抜けを防止する。更に、過応力防止片部33には、子基板保持部32が過度に外側に揺らうとする際に、子基板保持片32cが当接し、板状部32aに過応力がかかるのが防止される。なお、ラッチ部材30は、後述する接地補助部材40を図7に示すようにハウジング10に圧入固定

6

した後に、ラッチ受容凹部13に圧入される。

【0020】又、接地補助部材40は、金属板を打抜き及び歯け加工することによって形成され、図6及び図7に最もよく示されるように、ハウジング10の圧入用凹部16内に圧入される圧入板部41と、圧入板部41から前方に断面略I字形で延びるI字形部42と、I字形部42上壁の前端から折り返されて後方に向けて斜め上方に片持ち梁状に延びる、子基板60の裏面に形成された接地パターン(図示せず)に弹性的に接触する第1弹性接触部43と、I字形部42上壁の側端から上方に向けて折り曲げられると共に外側に向けて後方に片持ち梁状に延びる、ラッチ部材30の板状部32aの側面に弹性的に接触する第2弹性接触部44とを具備している。接地補助部材40の金属板としては、例えば、ステンレス製の金属板が好ましい。I字形部42は、接地補助部材40の圧入板部41がハウジング10の圧入用凹部16に圧入された際に図7(A)に示すようにハウジング10の突起部15bを挟み込み、これにより接地補助部材40の上下方向の移動の規制を補助する。又、このI字形部42には、ラッチ部材30がラッチ受容凹部13内に圧入されると、図4に示すようにラッチ部材30の板状部32aの下端から内側に折り曲げられた凸片32cが入り込み、これによりラッチ部材30の上下方向の移動の規制を補助する。又、第2弹性接触部44は、図4及び図8に示すように、接地補助部材40の圧入板部41がハウジング10の圧入用凹部16内に圧入された後、ラッチ部材30の圧入板部31がラッチ受容凹部13内に圧入されると、ラッチ部材30の板状部32aの側面に弹性的に接触する。第2弹性接触部44の弹性力は、ラッチ部材30の板状部32aの弹性力と比較してかなり小さいので、第2弹性接触部44の弹性力によってラッチ部材30の子基板保持片32cは子基板60の縁から外れることはない。一方、第1弹性接触部43は、子基板60が図8に示すように第1角度から第2角度に回転する際に、子基板60の接地パターンに接触すると共に子基板60への弹性力が増す方向に働く。

【0021】図8(B)に示すように、子基板60が第2角度に保持される際には、接地補助部材40の第1弹性接触部43が子基板60の接地パターンに接触していると共に第2弹性接触部44がラッチ部材30の板状部32aに接触しており、更にラッチ部材30のソルダベグ34が親基板50の接地パターンに半田接続されているので、子基板60の接地パターンは親基板50の接地パターンに接続される。この場合において、子基板60が何らかの外的要因により第2角度から更に回転されラッチ部材30の子基板保持片32cから離れたとしても接地補助部材40の第1弹性接触部43は子基板60の接地パターンに弹性的に接触しているので、子基板60の親基板50に対する接続状態は解除されない。なお、第1弹性接触部43は、子基板60が第1角度から第2

(5)

特開2000-208183

7

角度に回転する際に、子基板60の接地パターンに接触すると共に子基板60への弾性力が増す方向に拘束ので、子基板60が第2角度から更に回転されたとしても、第1弹性接觸部43の子基板60に対する弹性力が一層増加し、第1弹性接觸部43は子基板60から確実に離れる事ではなく、子基板60の親基板50に対する接地がより一層確実になされる。

【0022】次に、図10乃至図16を参照して本発明のカードエッジコネクタの他の実施形態を説明する。図10は、本発明のカードエッジコネクタの他の実施形態の平面図である。図11は、図10のカードエッジコネクタの正面図である。図12は、図10のカードエッジコネクタに使用されるラッチ部材の平面図である。図13は、図12のラッチ部材の右側面図である。図14は、図12のラッチ部材の底面図である。図15は、図12のラッチ部材の正面図である。図16は、子基板が第2角度に回転された状態の部分断面図である。

【0023】図10乃至図16において、カードエッジコネクタ201は、親基板240に取り付けられ、長手方向に延びる子基板受容凹部211を有する絶縁性のハウジング210と、親基板240に接続され、ハウジング210の長手方向に沿って上下2列状に配置された複数のコンタクト220と、ハウジング210の長手方向の両端部近傍に配置され、子基板受容凹部211内に第1角度で挿入された後回転されて第2角度となった子基板250を第2角度に保持する1対の金属製のラッチ部材230とを具備している。図1乃至図8に示すカードエッジコネクタと異なり、接地補助部材は設けられていない。そして、子基板250は、子基板受容凹部211内に第1角度で挿入される際に、上下2列状に配置された複数のコンタクト220の列間に入り込み、回転されて第2角度に保持される際(図16参照)には、上下2列のコンタクト220に接触し、これにより子基板250と親基板240との電気的接続が達成される。

【0024】ハウジング210は、図10及び図11に示すように、内部に長手方向に延びる子基板受容凹部211を有する略矩形体で形成された絶縁性の一体部材である。ハウジング210は、絶縁性の樹脂材を形成することによって形成される。ハウジング210の長手方向両端近傍には、ラッチ部材230の圧入板部233を圧入固定するための1対のラッチ圧入凹部212が形成されている。又、子基板受容凹部211の長手方向右端(図11における右端)寄りには、子基板250の逆差しを防止するためのリブ213が設けられている。リブ213は、子基板受容凹部211の上壁214から下壁215に向けて延びるが、下壁215との間には、隙間216が形成されている。リブ213が子基板受容凹部211の下壁215に連結していると、ハウジング210を成形する際に、子基板受容凹部211の下壁215はリブ213によって引張られて変形することがある

8

が、この隙間216が形成されていることにより、子基板受容凹部211の下壁215は成形時にリブ213によって引張られず、変形しない。

【0025】又、ラッチ部材230は、金属板を打抜き及び曲げ加工することによって形成され、図12乃至図16に示すように、互いに折り重ねられた2枚の平板部231、232を具備している。そして、この平板部231、232のうちの一方の平板部231には、後端(図12における右端)に位置するハウジング210のラッチ圧入凹部212内に圧入される圧入板部233と、下端から外側(図12における上側)に向けて折り曲げ形成された、親基板240の接地パターンに半田接続される接続部234と、前端に位置する、子基板250を第2角度に保持する子基板保持部235と、下端から内側に向けて折り曲げ形成された過応力防止片236とを一体的に設けている。又、平板部231、232のうちの他方の平板部232には、下端から内側に向けて折り曲げられると共に前方に向けて延びる、子基板250の接地パターンに弾性的に接触する弹性接觸片237を一体的に設けている。過応力防止片236は、弹性接觸片237の下側に位置し、弹性接觸片237が下方に過度に拘束のを防止する。このため、弹性接觸片237は塑性変形することはない。又、過応力防止片236は、他方の平板部232の下側に位置し、子基板保持部235によって保持された子基板250が上方へ無理に付勢される際に、一方の平板部231に設けられた子基板保持部235が塑性変形することはない。子基板保持部235は、一方の平板部231の前端から延びて内側に突出した鉤型のフック部235aと、平板部231の下端から内側に折り曲げられた子基板保持部235bと、平板部231の下端から内側に折り曲げられた過移動防止片235cとを一体的に設けている。ここで、子基板保持片235は、図16に示すように、子基板受容凹部211内に挿入された子基板250を第1角度から第2角度に回転すると、一方の平板部231の弾性力により一旦外側に移動してから元の位置に復帰し、子基板250の縁部の上面に接して子基板250の浮き上がりを防止する。又、フック部235aは、子基板250が第2角度に位置する際に子基板250の縁部に形成された切欠(図示せず)内に入り込み、子基板250のコネクタ1からの抜けを防止する。過移動防止片235cは、子基板250が弹性接觸片237に接触する際に子基板250の下方への過度の移動を防止すると共に、子基板保持片235bを外側へ変位させて子基板250の保持を解除する際に他方の平板部232に当接して一方の平板部231の外側への過度の変位を防止する。子基板250の下方への移動が過移動防止片235cによって防止さ

(5)

特開2000-208183

19

9

れるので、第2角度位置において子基板250は子基板保持部235から離脱することはない。又、過移動防止片235aは、子基板保持片235bを外側へ変位させて子基板250の保持を解除する際に他方の平板部232に当接して一方の平板部231の外側への過度の変位を防止するので、子基板250の保持を解除する際の一方の平板部の塑性変形が防止される。

【0026】図16に示すように、子基板250が第2角度に保持される際には、ラッチ部材230の弾性接触片237が子基板250の接地パターンに接触していると共にラッチ部材230の接続部234が親基板240の接地パターンに半田接続されているので、子基板250の接地パターンは親基板240の接地パターンに接地される。図10乃至図16に示すカードエッジコネクタ201は、図1乃至図8に示すカードエッジコネクタ1と比較して子基板250の親基板240に対する接地をラッチ部材230のみで行い、接地補助部材40を使用しない点で利点がある。そして、子基板250がどちらかの外的要因により第2角度から更に回転されてラッチ部材230の子基板保持片235bから離れたとしてもラッチ部材230の弾性接触片237は子基板250の接地パターンに弾性的に接触しているので、子基板250の親基板240に対する接地状態は解除されない。なお、弾性接触片237は、子基板250が第1角度から第2角度に回転する際に、子基板250の接地パターンに接触すると共に子基板250への弾性力が増す方向に揺むので、子基板250が第2角度から更に回転されたとしても、弾性接触片237の子基板250に対する弾性力が一層増加し、弾性接触片237は子基板250から確実に離れることはなく、子基板250の親基板240に対する接地がより一層確実になされる。

【0027】ハウジング210に上下2列状に配置された複数のコンタクト220の最右端(図11における最右端)の上下2列のコンタクト221、222は、親基板240からの電力を子基板250上の遮断部品に供給するための遮断用のコンタクトである。この遮断用のコンタクト221、222の通路中において、入の指がこれらコンタクト221、222に触れると、感電する虞れがあるために、その触れを防止する必要がある。そこで、ハウジング210の下壁215には、下側のコンタクト222の両側を前方に延びる1対の突起部217a、217bが設けられ、上壁214には、リブ213が設けられ、ハウジング210の後壁には、上側のコンタクト221の両側を後方に延びる突起部217c、217dが設けられている。突起部217a、217bは、親基板240に接続される下側のコンタクト222の半田接続部に指が触れるのを防止し、リブ213は、下側のコンタクト222の接觸部に指が触れるのを防止し、突起部217c、217dは、上側のコンタクト221に指が触れるのを防止する。

【0028】本発明のカードエッジコネクタにおけるラッチ部材の変形例を図17及び図18を参照して説明する。図17はラッチ部材の変形例の平面図、図18は図17のラッチ部材の右側面図である。

【0029】図17及び図18に示すラッチ部材330は、図12乃至図16に示すラッチ部材230と同様に、金属板を打抜き及び曲げ加工することによって形成され、互いに折り重ねられた2枚の平板部331、332を具備している。そして、この平板部331、332のうちの一方の平板部331には、ハウジング210のラッチ圧入凹部212内に圧入される圧入板部333と、下端から外側に向けて折り曲げ形成された、親基板240の接地パターンに半田接続される接続部334と、子基板250を第2角度に保持する子基板保持部335とを一体的に設けている。又、平板部331、332のうちの他方の平板部332には、下端から内側に向けて折り曲げられた過応力防止片336と、過応力防止片336の内側縁の前端部から外側に折り重ねられると共に後方に向けて延びる、子基板250の接地パターンに弾性的に接觸する弾性接触片337を一体的に設けている。過応力防止片336は、弾性接触片337の下側に位置し、弾性接触片337が下方に過度に揺むのを防止する。このため、弾性接触片337は塑性変形することはない。又、過応力防止片336は、平板部332の下端の長手方向の略全域から内側に向けて折り曲げられている。子基板保持部335は、図12乃至図16に示すラッチ部材230と同様に、一方の平板部331の前端から延びて内側に突出した鉤型のフック部335aと、平板部331の上端から内側に折り曲げられた子基板保持片335bと、平板部331の下端から内側に折り曲げられた過移動防止片335cとを一体的に設けている。過移動防止片335cは、子基板250が弾性接触片237に接觸する際に子基板250の下方への過度の移動を防止すると共に、子基板保持片335bを外側へ変位させて子基板250の保持を解除する際に他方の平板部332に当接して一方の平板部331の外側への過度の変位を防止する。子基板250の下方への移動が過移動防止片335cによって防止されるので、第2角度位置において子基板250は子基板保持部335から離脱することはない。又、過移動防止片335cは、子基板保持片335bを外側へ変位させて子基板250の保持を解除する際に他方の平板部332に当接して一方の平板部331の外側への過度の変位を防止するので、子基板250の保持を解除する際の一方の平板部331の塑性変形が防止される。なお、平板部332に形成された過応力防止片336は、平板部332の下端の長手方向の略全域から内側に向けて折り曲げられているので、図12乃至図16に示すラッチ部材230の平板部232よりも断面二次モーメントが大きく、過移動防止片335cが当接する最に、外側に向けて変形する量が

(7)

特開2000-208183

11

少なく、一方の平板部331の塑性変形を一層効果的に防止する。

【0030】図19は、ラッチ部材の他の変形例を示す平面図である。図19に示すラッチ部材430は、基本的な構造は図17及び図18に示すラッチ部材330と同様であり、弹性接触片437の伸び方のみがラッチ部材330と異なる。即ち、弹性接触片437は、過応力防止片436の内側縁の後端部から外側に折り重ねられると共に前方に向けて延びる。

【0031】図20は、ラッチ部材のもう一つ他の変形例を示す斜視図である。図20に示すラッチ部材530は、図12乃至図16に示すラッチ部材230と同様に、金属板を打抜き及び曲げ加工することによって形成され、互いに折り重ねられた2枚の平板部531、532を具備している。そして、この平板部531、532のうちの一方の平板部531には、後方に位置するハウジング210に嵌入される圧入板部(図示せず)と、下端から外側に向けて折り曲げ形成された、親基板240の接地パターンに半田接続される接続部(図示せず)と、前方に位置する、子基板250を第2角度に保持する子基板保持部(図示せず)とを一体的に設けている。子基板保持部には、平板部531の下端から内側に折り曲げられた過移動防止片535が設けられている。過移動防止片535は、子基板保持部を外側へ変位させて子基板250の保持を解除する際に他方の平板部532に当接して一方の平板部531の外側への過度の変位を防止する。又、平板部531、532のうちの他方の平板部532には、下端から内側に向けて折り曲げられると前方に向けて延びる、子基板250の接地パターンに弹性的に接触する弹性接触片537と、弹性接触片537の内側縁の後方部から上方に折り曲げられた突出部536とを具備している。突出部536は、子基板250が子基板保持部によって第2角度に保持される際に、子基板250に形成された開口に入り込み、子基板250の前方への抜けを防止する。

【0032】

【発明の効果】請求項1に係るカードエッジコネクタによれば、子基板の接地パターンに彈性的に接触する第1弾性接触部及びラッチ部材に彈性的に接触する第2弾性接触部を有する金属製の接地補助部材をハウジングに取り付けたので、子基板の接地パターンは接地補助部材及びラッチ部材を介して親基板の接地パターンに確実に接地される。

【0033】又、請求項2に係るカードエッジコネクタによれば、前記接地補助部材の前記第1弾性接触部は、前記子基板が第1角度から第2角度に回転する際に、前記子基板の接地パターンに接触すると共に前記子基板への弾性力が増す方向に捲むようになっているので、子基板が第2角度から更に回転されたとしても、第1弾性接触部の子基板に対する弾性力が一層増加し、第1弾性接

12

触部は子基板から確実に離れる事ではなく、子基板の親基板に対する接地がより一層確実になされる。

【0034】請求項3に係るカードエッジコネクタによれば、ラッチ部材に、子基板の接地パターンに弹性的に接触する弾性接触片を一体的に設けたので、子基板の接地パターンはラッチ部材のみによって親基板の接地パターンに確実に接地される。

【0035】請求項4に係るカードエッジコネクタによれば、前記ラッチ部材に、前記弾性接触片が過度に捲むのを防止する過応力防止片を一体的に設けたので、子基板の接地パターンが弾性接触片に接触する際に弾性接触片が塑性変形することはない。

【0036】請求項5に係るカードエッジコネクタによれば、前記ラッチ部材が、互いに折り重ねられた2枚の平板部を具備し、該平板部の一方に前記親基板の接地パターンに接続される接続部、前記子基板を前記第2角度に保持する子基板保持部、及び前記過応力防止片を一体的に設け、前記平板部の他方に前記弾性接触片を一体的に設けたので、子基板を保持する機能、子基板を親基板に確実に接地する機能、及び弾性接触片の過応力防止機能を備えた一体構成のラッチ部材を簡単に製造することができる。

【0037】請求項6に係るカードエッジコネクタによれば、前記過応力防止片は、前記子基板保持部によって保持された前記子基板が上方へ無理に付勢される際に前記平板部の他方に当接して前記平板部の一方の浮き上がりを防止するので、子基板が上方へ無理に付勢される際に、一方の平板部に設けられた子基板保持部が塑性変形することはない。

【0038】請求項7に係るカードエッジコネクタによれば、前記平板部の一方に、前記子基板が前記弾性接触片に接触する際に前記子基板の過度の移動を防止する過移動防止片を一体的に設けたので、子基板保持部によって保持される第2角度位置において子基板は子基板保持部から離脱することはない。

【0039】請求項8に係るカードエッジコネクタによれば、前記過移動防止片は、前記子基板保持部を外側へ変位させて前記子基板の保持を解除する際に前記平板部の他方に当接して前記平板部の一方の外側への過度の変位を防止するので、子基板の保持を解除する際の一方の平板部の塑性変形を防止することができる。

【図面の簡単な説明】

【図1】本発明のカードエッジコネクタの一実施形態の平面図である。

【図2】図1のカードエッジコネクタの左側面図である。

【図3】図1のカードエッジコネクタの正面図である。但し、図3においてコンタクトは省略してある。

【図4】図1の矢印A部分の拡大図である。

【図5】図1のカードエッジコネクタに使用されるハウ

(8)

特開2000-208183

13

14

シングを示し、(A)は部分平面図、(B)は部分正面図、(C)は(A)の5c-5d線に沿った断面図である。

【図6】図1のカードエッジコネクタに使用される接地補助部材を示し、(A)は平面図、(B)は正面図、(C)は右側面図である。

【図7】接地補助部材をハウジングに取り付けた状態を示し、(A)は正面図、(B)は側断面図である。

【図8】図1のカードエッジコネクタに挿入された子基板の回転動作を示し、(A)は子基板が第1角度で挿入された状態の断面図、(B)は子基板が第2角度に回転された状態の断面図である。

【図9】従来例のカードエッジコネクタの部分斜視図である。

【図10】本発明のカードエッジコネクタの他の実施形態の平面図である。

【図11】図10のカードエッジコネクタの正面図である。

【図12】図10のカードエッジコネクタに使用されるラッチ部材の平面図である。

【図13】図12のラッチ部材の右側面図である。

【図14】図12のラッチ部材の底面図である。

【図15】図12のラッチ部材の正面図である。

【図16】子基板が第2角度に回転された状態の部分断面図である。

\* 面図である。

【図17】ラッチ部材の変形例の平面図である。

【図18】図17のラッチ部材の右側面図である。

【図19】ラッチ部材の他の変形例の平面図である。

【図20】ラッチ部材のもう一つ他の変形例の斜視図である。

【符号の説明】

1, 210 カードエッジコネクタ

10, 210 ハウジング

11, 211 子基板受容凹部

30, 230 ラッチ部材

40 接地補助部材

43 第1弹性接触部

44 第2弹性接触部

50, 240 朝基板

60, 250 子基板

231, 232 平板部

234 接続部

235 子基板保持部

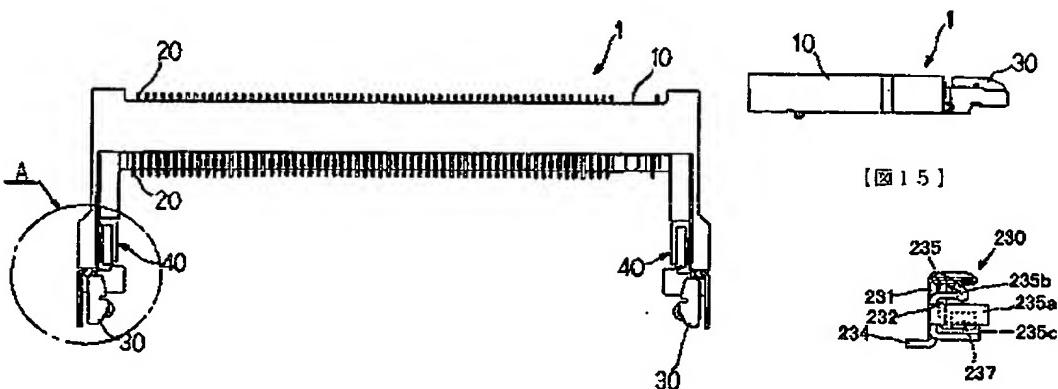
20 235c 遷移効防止片

236 過応力防止片

237 弹性接触片

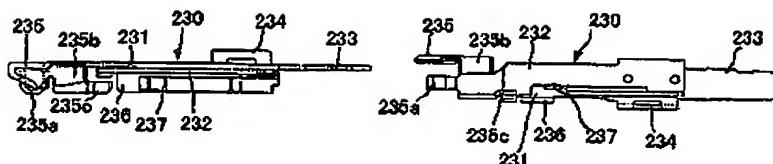
【図1】

【図2】



【図12】

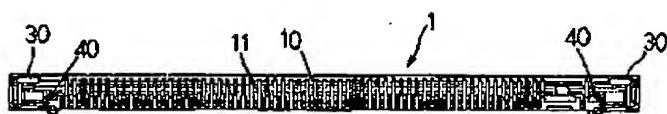
【図13】



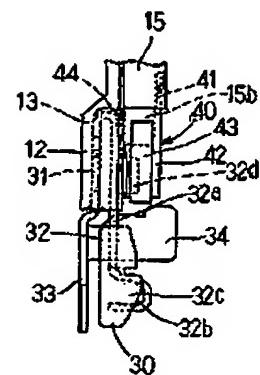
(9)

特開2000-208183

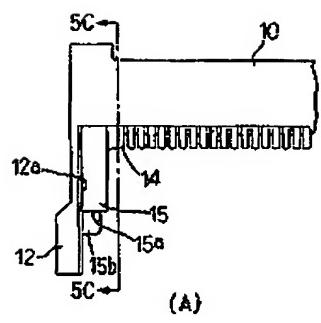
【図3】



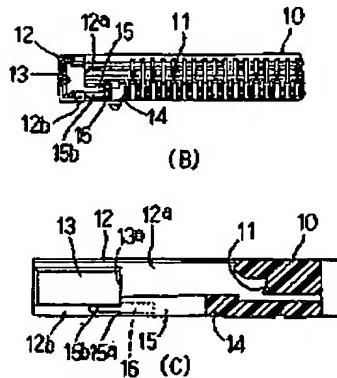
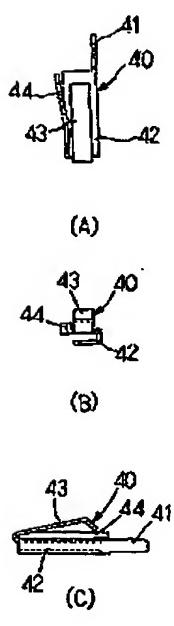
【図4】



【図5】

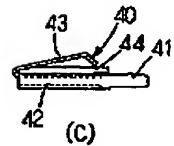


【図6】



(B)

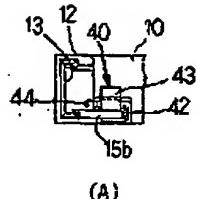
(C)



(10)

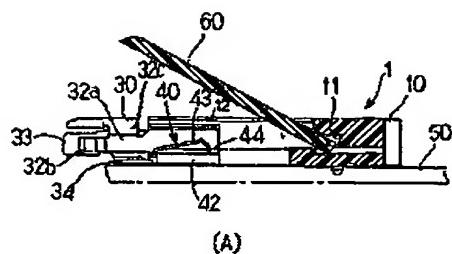
特開2000-208183

【図7】

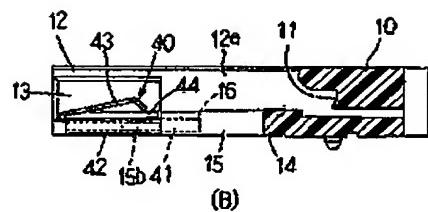


(A)

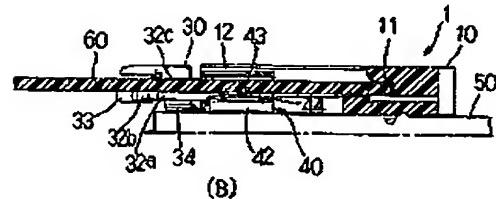
【図8】



(A)

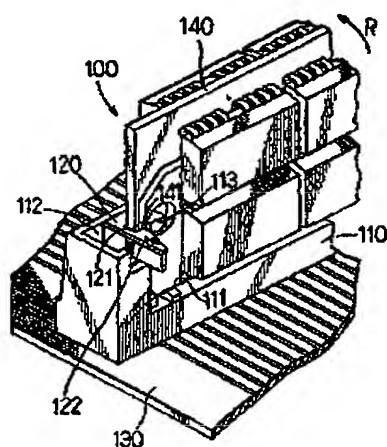


(B)

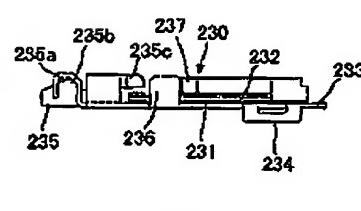


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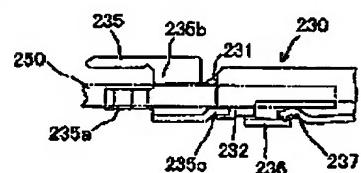
【図9】



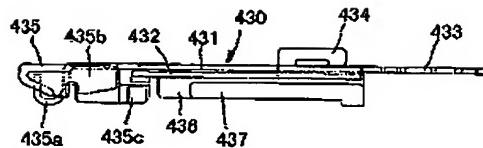
【図14】



【図16】



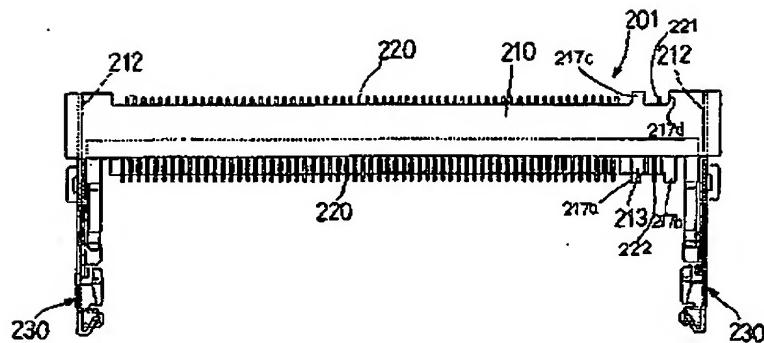
【図19】



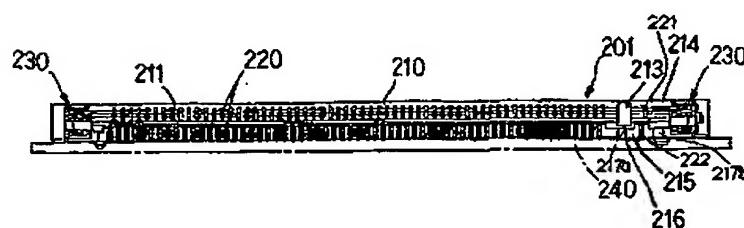
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特開2000-208183

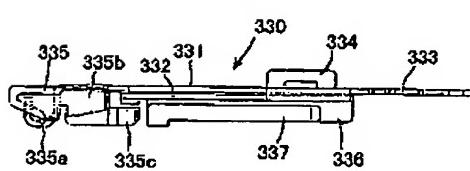
【図10】



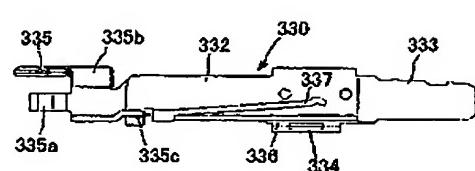
【図11】



【図17】



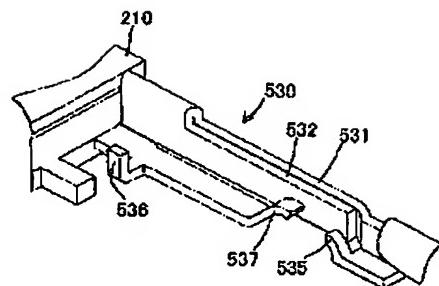
【図18】



(12)

特開2000-208183

[図20]



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フロントページの続ぎ

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FC05 FC07 FC19 FC25 FC31  
FC36 HC14 HC16 LA03  
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